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Dr Sundaresan Appointed Director, NEERI

Dr B. B. Sundaresan, Dean of the College of Engineering, Guindy, has been appointed Director of the National Environmental Engineering Research Institute (NEERI), Nagpur, with effect from 29 June 1977. Born on 19 February 1929, Dr Bommaya Bala Sundaresan obtained B. E. degree

from the Madras University in 1951. After serving as a junior engineer in the Public Works Department of Tamil Nadu, he joined the State Directorate of Technical Education in 1953 as an associate lecturer.

He obtained his master's degree in public health engineering in 1959 from the Madras University. During 1961-66, he was engaged in research at the University of Florida, Gainesville, Florida, USA, wherefrom he obtained Ph. D. degree in sanitary engineering in 1963. Continuing his postdoctoral research in air pollution control systems, he developed and patented a dry process for control of oxides of nitrogen emissions from nitric acid manufacture. On return to India in 1966 he was appointed an assistant professor of public health engineering and promoted as professor in 1968. Since 1974 he has been the professor-in-charge of post-graduate studies and research and held charge as the dean of College of Engineering, Guindy, Madras.

Dr Sundaresan has 25 technical papers to his credit and is the co-au-

thor of a book entitled 'Manual on Water Supply'. He was awarded the Institution of Engineers prize in 1965 for his paper 'Basic mechanisms in anaerobic digestion of sewage sludge' and in 1973 for two other papers entitled 'Model studies on entrainment aerators' and 'Design criteria for batch operation of oxidation ditches'.

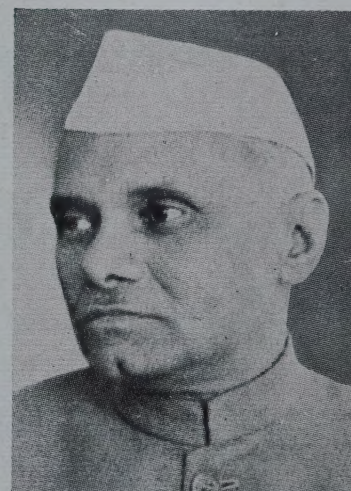
Dr Sundaresan is a fellow of the Institution of Engineers (India) and member of the American Society of Civil Engineers; Water Pollution Control Federation, USA; American Water Works Association; Air Pollution Control Association, USA; Computer Society of India; and Indian Society for Technical Education. Besides, he is a member of the board of post-graduate studies in engineering, Madras University; board of studies in civil engineering, Andhra and Kerala universities; Tamil Nadu Environmental Pollution Control Board; National Committee on Environmental Planning; etc. Since 1975, he has been a member of the executive committee of NEERI.

Dr Sundaresan visited Thailand where he attended the regional seminar on Sanitary Education in South-East Asia on invitation from World Health Organization during 1973 and also visited UK to attend the research workers' meeting convened by the International Development Research Centre, Canada, at London during October 1976.

Get-together on School Buildings

A get-together on school buildings constructed by the Central Building Research Institute (CBRI), Roorkee, in collaboration with the Govern-

Dr Atma Ram Appointed Chairman, NCST



Dr Atma Ram, former Director General, Council of Scientific & Industrial Research, has been appointed Chairman of the reconstituted National Committee on Science and Technology.

ment of Manipur was organized on 11 and 12 June at Imphal by the Department of Education, Government of Manipur. A large number of officers from the governments of Manipur, Nagaland, Mizoram, Sikkim, Assam and Tripura; CBRI; and National Staff College, Delhi, participated in the get-together.

Inaugurating the get-together Shri H. S. Bhutalia, Chief Secretary to the Government of Manipur, laid emphasis on the provision of functional and economical school buildings, and in this context appreciated the efforts made by the Department of Education, Manipur, and CBRI for putting up schools with limited funds and resources. He observed that a similar construction programme could be taken up for housing and hospital

buildings for the benefit of the people of the state.

Prof. Dinesh Mohan, Director of CBRI, in his presidential address, expressed happiness in being able to help the state in putting up 30 out of 80 schools within a short time. He offered to help other states also in their construction programmes. Shri V. K. Mathur of CBRI gave a brief account of the research and development work done by the institute in collaboration with the Department of Education, Manipur, and also highlighted the salient features of the construction programme including the scientific background in developing the plan, construction system and management.

Shri M. D. Tyagi, Secretary (Education), Government of Manipur, explained briefly the managerial aspects of the construction programme along with its potential for extension in the other states of the region.

The get-together was followed by a discussion by the participants who sought clarifications on a number of points. In addition to the school building at Uhar village near Imphal which was inaugurated by the Chief Secretary, the delegates visited five other school sites where they were explained the details of construction techniques. On this occasion the Government of Manipur brought out a special booklet entitled 'Planning Norms, Design and Construction for Schools' prepared jointly with CBRI.

Industry-ARAI Get-together

A get-together of the entrepreneurs in the small- and medium-scale sector and the representatives of the state and central governments was held on 25 April 1977 at the Automotive Research Association of India (ARAI), Poona. Welcoming the delegates, Shri B.S.V. Rao, Director of ARAI, explained the facilities extended by ARAI and called upon the participants to identify their requirements with a view to drawing upon the services according to the specific needs. He said that the Association would establish a full-

fledged research institute and a number of programmes would be taken up with the assistance of the United Nations Development Programme.

The delegates were taken round the laboratories and the Director explained to them the objectives and perspectives of the institute with emphasis on the services that could be rendered in specialized areas.

Presiding over the get-together, Shri M. Gurudutt, Vice President of ARAI, said that fuel economy was of paramount importance to the individual consumers. Roads should also improve along with the vehicles, he added.

India-USSR Cooperation on Alternative Sources of Energy

In pursuance of the agreement with the Government of India and the Government of USSR, Dr D. J. Mehta, Director, Central Salt & Marine Chemicals Research Institute, Bhavnagar, led a three-member Indian delegation to Russia between 1 and 15 June 1977 to explore the possibilities of seeking cooperation from USSR in the area of utilization of alternative sources of energy. Following preliminary discussion with the Russian counterpart the Indian delegation visited six research organizations where work on utilization of alternative sources of energy was in progress. The Indian delegation also briefed the Russian counterpart about the Indian research efforts in this area. At the conclusion of the visit, a protocol was signed by Dr B. Sobiniakov, Chief of Science Department, and Dr Mehta, and the following solar energy areas were identified tentatively for cooperation between the two countries: (i) Selective coatings, (ii) Solar thermoelectric generators, (iii) Solar power stations, and (iv) Sterling engine.

It was also agreed that Russian scientists would visit India some time in November 1977 and crystallize the cooperative projects at the conclusion of their visit.

The other two members of the delegation were Dr H. P. Garg, Head, Solar Energy Studies Section, Central Arid Zone Research Institute, Jodhpur, and Shri M. L. Gupta, Head, Geothermal Research and Exploration Group, National Geophysical Research Institute, Hyderabad.

Collaborative Agreements between NCL and Industries

A collaborative agreement for the development of technology (on pilot plant scale) for silicone intermediates was executed between the Council of Scientific & Industrial Research (CSIR)/National Chemical Laboratory (NCL) and HICO Products Pvt Ltd, Bombay. Under the agreement, HICO will erect and run a pilot plant for the manufacture of silicone intermediates at their site.

* * *

Secrecy agreements were signed between CSIR/NCL and Tata Consulting Engineers (TCE), Bombay, whereby TCE will evaluate the NCL processes for the manufacture of Dimethoate and Fenitrothion with a view to preparing a project feasibility report on the processes for their present/prospective clients. A similar secrecy agreement was also signed with R.L. Dalal and Co., Bombay, to evaluate these processes.

* * *

A collaborative agreement was signed between CSIR/NCL and Dharamsi Morarji Chemicals Co. Ltd (DMCC), Bombay, for the development of technology for the manufacture of thionyl chloride from sulphur sludge/sulphur based on the NCL process. Under the agreement, DMCC will set up at their site a semi-commercial plant for thionyl chloride based on NCL technology.

* * *

Travancore Titanium Products Ltd (TTP), Trivandrum, are collaborating with NCL for scaling up the NCL process for TiCl_4 on a commercial scale of 2000 tonnes/annum, the capacity which will meet TTP's present requirement of TiCl_4 as the nucleating

agent for their rutile titanium dioxide production. This will also serve as a unit to collect engineering data for a still larger capacity plant, of the order of 50,000 tonnes/annum. TTP has sought the association of Humphreys and Glasgow, Bombay, for engineering services on the project; this firm in turn has signed a secrecy agreement with the laboratory for the purpose.

Prize for Domestic Chullah Design

An improved domestic *chullah* (oven) designed by the Coal Survey Laboratory (CSL), Bilaspur (Madhya Pradesh), of the Central Fuel Research Institute, Dhanbad, has been chosen for the third prize at a national competition organized by Coal India Ltd. The design, fabrication and operational method were provided by a team comprising Shri M.G. Bage, Shri S.K. Chakraborty and Shri Sunil Chakravarti of CSL, Bilaspur, who worked under the guidance of Shri B.S. Deshmukh.

The low-cost *chullah*, on ignition, burns smokelessly any type of raw coal by effecting complete combustion of emitted volatiles (which cause smoke hazard) by channelling them through a chimney.

The portable *chullah* has a circular iron grate with earthen lining as is commonly available in the market. A small adjustable chimney is attached to the grate for complete combustion of the volatiles, which otherwise cause smoke hazard. The whole outfit costs Rs 15-20.

Coal India Ltd intends to invite small-scale engineering industries to launch large-scale manufacture of the *chullah* throughout the country.

Petroleum Conservation Abstracts

The Indian Institute of Petroleum (IIP), Dehra Dun, has started publishing from this year a new abstracting periodical entitled 'Petroleum Conservation Abstracts'. This periodical (mimeographed), to be issued quarterly, is devoted to petroleum pro-

ducts, mainly engine and industrial fuels, and lubricants. The first issue of the journal contains 23 abstracts of papers published in 15 periodicals and the abstracts cover gasoline, kerosene, diesel, lube oil and other petroleum products.

Enquiries regarding the publication may be addressed to: The Director, Indian Institute of Petroleum, Dehra Dun 248005.

PROGRESS REPORTS

CRRI Annual Report : 1976-77

The Central Road Research Institute (CRRI), New Delhi, has published its annual report for 1976-77. The report presents a concise account of the R & D activities of the institute under the following subdisciplines: soils; flexible pavements; rigid pavements; roads; traffic engineering, economics and statistics; extension; bridges; and information and operational research.

The institute has been actively engaged in the Karimnagar development project of CSIR. Efforts were continued towards evolving economically suitable specifications for rural roads and making judicious and scientific use of the local materials. The work related to assessment of site conditions, evaluation of subgrade soils, materials surveys, measures for improvement of drainage, etc. Based on field and laboratory investigations, recommendations were given with regard to the alignments, crust compositions, choice of materials, construction specifications, quality control, etc.

Further work on the development of air-photo patterns for the identification and location of hidden laterite and suitable *morrum* for road construction was undertaken. Areas of over 5000 km² around Madras and 1000 km² in Andhra Pradesh were covered during these investigations. These studies have given encouraging results, and broad terrain features of the area have been correlated with air-photo elements. The Geological Survey of India has utilized the air-

photo patterns, developed by CRRI, for the large-scale survey of kankar deposits in the alluvial plains covering an area of about 2500 km² in Sitapur district of Uttar Pradesh. The accuracy of interpretation has been reported to be of about 80%.

The follow-up observations on the Indian Roads Congress (IRC) Test Track Project on NH5 at Paravali, Andhra Pradesh, to evolve suitable specifications for the construction of pavements in black cotton soil areas were continued. Also, experiments were carried out for finding the soaking requirements of black cotton soils for CBR test. The study would furnish a quantitative idea about the correction to be made in CBR in case the black cotton soil samples are deficiently soaked for lesser period.

The coordination council for the engineering group of CSIR laboratories entrusted the institute with the study on in-plant variation in the quality of fly ash from 'C' thermal power station, New Delhi. The station has five generation units and produces about 900 tonnes of fly ash per day. Fly ash from the station was found generally to be suitable for use in lime-fly ash soil stabilization, lime-fly ash concrete for making sub-base in pavement. This fly ash could replace 15-20% of cement-fly ash concrete as per IRC : 68-1976. It was also found to be suitable for making lime-fly ash sand bound macadam in place of conventional WBM. Similar studies were carried out on stabilization of red soil of Karnataka State using Neyveli fly ash with and without lime. It was observed that Neyveli fly ash alone, which was hydraulic in nature, as well as lime - Neyveli fly ash mixture, improved the split tensile strength of the stabilized red soil, as compared to only lime stabilization.

Studies relating to traffic flow were carried out around Dufferine bridge in Delhi at the request of Northern Railway. The introduction of electrification of railways in Delhi had necessitated the raising of the bridge. The study was aimed at evaluation of

alternative alignments and locations for a bridge in this area. The new site for an alternative bridge proposed by the institute is Naya Bazar and Gokhale Marg. The institute conducted traffic and parking studies in Lucknow city, and traffic circulation studies in Allahabad railway station area, Begum Bridge area (Meerut), Jaipur city, Goa and Patiala.

The wear resistance apparatus based on IS: 164-1951 was redesigned and improved, incorporating the facilities for testing the performance of the traffic paint on the road under controlled weather conditions. A regulator to control the revolution of a circular test track has been added. After the fabrication of this machine, the relation between accelerated laboratory tests through this improved machine and actual field performance of the paint would be determined.

An automatic device for joint seal-

ing of concrete pavements for roads and airfields has been developed. The prototype is undergoing trials. The device will enable cleaning of joints in advance of sealing, automatic heating of the sealing compound, controlled flow of sealing compound into the joint groove, etc.

An improved nuclear surface density gauge was designed and fabricated for finding the soil density. It weighs just half of the previous gauge developed, thereby making it more handy for field work and also reduces the cost of fabrication. It has two detectors and the time taken for each measurement is halved.

Two processes relating to rotillor (developed jointly by CRRRI and MERADO, Poona) and automatic road unevenness recorder were released for commercial exploitation through the National Research Development Corporation of India.

PROCESSES AND PRODUCTS READY FOR COMMERCIAL UTILIZATION

Lead Sulphide Photo-conductive Cell for IR Detection

The Central Electrochemical Research Institute, Karaikudi, has developed know-how for the production of lead sulphide cells for detecting infrared radiations. These cells can detect infrared radiations in the region of 1-3 μm with a peak at 2.1 μm and are comparable in performance to those which are imported. Infrared detectors have a variety of military and civilian uses. The infrared detector developed by CECRI is capable of detecting the 2.7 μm water carbon dioxide band in the plume of heated gas from a hydrocarbon burning jet engine. Fire as well as overheating in hot axles in railway wagons can be detected. Intruding burglars and other moving objects can also be detected. The cells find use in infrared telephony (ships on formation, etc.) and also in detecting energy installations without being detected, as for example, factory

and ammunition production units. Image converters used for night driving such as in military movements during nights, weapon firing surveillance and satellite tracking by using the multiple element scanners are some more uses to which these infrared detectors can be put. As regards civilian uses, radiation pyrometers are the most important. In geological applications, the infrared detectors can be used for providing information about the near-surface physical state of geological materials, particularly density, water content and heat transfer.

All the materials used for the production of these cells are available indigenously. With a total layout area of about 2500 ft^2 and a total capital investment of about Rs 4 lakh, an annual turnover of 6000-9000 cells could be obtained. With a suggested market price of Rs 60 for each cell as against about Rs 150 for the imported cell, a profit of 36% of return on in-

vestment is envisaged. The know-how is ready for commercial exploitation.

Further details can be had from the Director, Central Electrochemical Research Institute, Karaikudi 623006 or The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

Protein Chewy Candy

Protein chewy candy is a new product not available in the market at present. However, it may be liked by persons of all age groups as it is a new, tasty and nutritious confectionery. As such, a good demand for the product could be expected. The price envisaged for this product in the market is around Rs 15/kg.

According to the process developed by the Central Food Technological Research Institute, Mysore, the necessary ingredients for chewy candy are taken and mixed with a thick sugar syrup and cooked in a steam-jacketed kettle with stirrer. The cooked mass is subjected to the usual operations like plating, rolling, cutting, wrapping and final packing. Many of the candy flavours available in the market have been found to be compatible with this confectionery.

The work has been carried out in the laboratory on 1.5 kg batch scale. In all, a quantity of about 100 kg of the product was prepared at the laboratory using this process. The candy prepared by this process contains 12-16% protein and therefore could be used as nutritional supplement by children and persons of all age groups. The conventional candy manufacturers can use their existing facilities to produce this candy. This process has also been tried on 100 kg batches in a conventional commercial confectionery factory. The consumer acceptability of the product has been established with persons of all age groups, especially children.

The raw materials required are edible-quality solvent-extracted groundnut flour or protein isolate, sugar, liquid glucose, condensed milk, vanas-

pati, suitable flavours and permitted food colours. All the raw materials are available indigenously.

The following are the major items of plant and equipment required: boiler, stainless steel steam-jacketed kettle with stirrer; stainless steel rollers (plain surface); cooling table with water circulation arrangement; candy cutters with adjustable knives; weighing balance; stainless steel sieve of 30 mesh with wooden frame; candy thermometer; twist wrapping machine; and heat-sealing machine. All these are available indigenously; only the twist wrapping machine may have to be imported.

The capacity of the suggested economic unit is 570 kg of chewy candy per 8-hr shift. The land requirement for plant and building is 500 m² while that for storage is 300 m².

The investment on plant and machinery and the working capital would be Rs 1.80 lakh and Rs 4.25 lakh respectively. The estimated cost of production is Rs 11.40 / kg of chewy candy.

Further particulars can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

NML-Alnama Lead Smelting

The National Metallurgical Laboratory (NML), Jamshedpur, has developed a simple, single-step, low-investment, non-polluting process for smelting lead from galena concentrates such as are usually obtained for pyrometallurgical smelting of lead.

The conventional pyrometallurgical smelting of lead involves updraft sintering of galena (lead sulphide) to form a sinter. Sinter of appropriate size range is charged into a blast furnace with coke and flux and smelted to obtain crude lead, matte and slag. The crude lead is further refined by the conventional pyrometallurgical technique. The conventional process, however, suffers from the following draw-

backs during smelting: (i) frequent 'channelling' resulting in a sinter, a mixture of overburnt and under-roasted masses, undesirable for blast furnace operation; (ii) large production of sinter fines necessitating their recycling, thus resulting in decreased production and increased operational cost; (iii) large amounts of galena go away as dust losses, resulting in less productivity and necessitating very costly dust catching installations; and (iv) severe pollution of atmosphere with sulphur dioxide and lead fumes where pollution control is non-existent or inadequate.

It is the main objective of NML-ALNAMA process to provide a method of smelting of lead from its concentrates by which the above-mentioned disadvantages are overcome. The major advantages of the NML process are low capital investment; non-pollution of atmosphere; low gestation period; use of cheap and commonly available reductant; flexibility so far as the form of energy is concerned, i. e. the process can be carried out with coal, gas, coke or oil; exploitation on scales using simple crucible furnaces or sophisticated electric furnaces; and the process lends itself to nodular expansion from a small beginning.

The process is based on metallothermic principle. The concentrates are mixed thoroughly with reductant and fluxes; and the mixture is compacted and heated to about 1350°C when lead metal is reduced and settles at the bottom while the non-metallic slag layer floats on top. Because of large differences in the melting points as well as the specific gravities of lead and the slag, a clean and clear separation of the metal from the slag is obtained. In several cases the purity of the metal obtained by this process is about 99.9% and it can be further refined by the usual refining steps with a recovery of 90% of the lead in the charge. Repeated pilot plant-scale trials of up to 100 kg batch scale in gas/oil fired furnace have been carried out at NML. For any given con-

centrate, consistent results of purity and recovery of lead can be obtained.

Silver, if present in economically attractive amounts, can be readily recovered from the lead metal obtained by the NML process by providing the usual desilvering and dezincing facilities which are readily compatible with the NML process know-how.

The raw materials needed are: lead concentrate reductant, fluxes, and oil. The main equipment and machineries required for this process are dryer, ball mill, mixer, pelletizer or briqueting press, smelting furnace, ladles, ingot moulds and instruments. All these raw materials and equipment are indigenously available.

The purity of lead obtained is about 99.9%. The suggested economic unit is a plant having a capacity to produce 1500 tonnes of lead metal per annum.

The cost of a plant with a capacity of 1500 tonnes per annum (based on 300 working days in a year) is estimated at about Rs 30 lakh. The conversion charges are estimated to be Rs 1600 per tonne of lead for a 70% lead concentrate yielding over 90% metal recovery.

Further particulars can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

Sensitive Zinc Oxide Electrostatic Photographic Paper

This is used for making copies of documents by the electrostatic photographic method. Zinc oxide coated paper is being produced in the country by some firms. However, there is scope for additional units.

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed a process for producing sensitive zinc oxide electrostatic photographic paper. The process consists in preparing the electrophotographic coating composition by mixing zinc oxide powder, a solvent, a binder resin in solution form and requisite quantity of dyes. The mixture is whip-

ped in a blender to a smooth, uniform consistency and coated on treated paper to a thickness of about 5μ . The paper on which the composition is coated is given a prior treatment to impart the property of solvent hold-out and increased electrical conductivity.

The process has been studied on bench scale. Paper sheets of 20 cm $\times$ 30 cm size have been used for coating. Zinc oxide in batches of 10-20 g was used to prepare the sensitive composition. The length of the bar coater used was about 30 cm.

Zinc oxide, solvent, resin binder, dyes and paper are the main raw materials required in the process.

The plant and machinery required are: blender, pretreatment machine, paper-coating machine, and electro-

photographic paper analyzer. All the items of plant and machinery, except the electrophotographic paper analyzer, are available indigenously.

The total investment to set up a plant capable of producing 300 tonnes of electrostatic photographic paper has been estimated at Rs 36.79 lakh (comprising Rs 1,33,500 as fixed capital on building, Rs 21,10,550 as fixed capital on plant, and Rs 14,34,700 as working capital). The production cost of the paper has been worked out to be Rs 19,000 per tonne. The return on investment is expected to be about 41%.

Further particulars can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

CSIR SUPPORT TO RESEARCH

New Schemes

Evaluation of Helminthological Sanification of Water Reservoirs of Western Rajasthan

Under this CSIR-supported research scheme granted to Dr H. S. Nama, Department of Zoology, University of Jodhpur, Jodhpur, it is proposed to analyze helminthic contamination of selected water reservoirs of certain villages of western Rajasthan and to suggest remedial measures to eradicate or minimize the infection, and to make the water suitable for human and livestock consumption. Although the region has a great potential for agriculture, dairy and livestock raising with the emergence of the Rajasthan canal, it is backward in certain respects as the many small *tankas* (built-in rainwater stores), ponds, tanks and other water reservoirs are unhygienic. These water bodies, used both by man and livestock, are perpetual sources of parasitic diseases such as ascariasis, dracontiasis (great menace

in certain villages) and enterobiasis in man; and fascioliasis, thysanosomiasis, taeniasis, trichuriasis and ascaridiasis in livestock.

The degree of contamination is correlated with the proximity to inhabited points, degree and kind of use of water and the type and age of the reservoir since construction. Moreover, consumption of water in lean periods from bottom leftovers leads to ascariasis and dracontiasis as ascarid eggs under embryonation and *Cyclops* infected with *Drancunculus* larva have a tendency to drop to the bottom.

The investigations proposed under the new scheme will fall into three phases: (i) periodic examination of selected water reservoirs, their benthic deposits and invertebrate fauna for helminthic infection; (ii) study of contamination while practising control measures, such as physical, chemical or biological; and (iii) analysis of the results. Indigenous methods will be worked out to eradicate or minimize the helminthic contamination.

Molecular Sieves as Polymerization Catalysts

Under a new CSIR scheme granted to Dr Mukul Biswas of the Department of Chemistry, IIT, Kharagpur, it is proposed to develop some useful polymerization catalysts based on molecular sieves. The specific objectives of this research are primarily to characterize suitable molecular sieves in respect of their efficiencies as polymerization catalysts and to establish the optimum conditions for achieving maximum catalytic efficiency. The polymerization behaviour of various monomeric entities in the presence of these catalysts and the conditions leading to the formation of high molecular weight polymers will also be examined. Furthermore, attempts will be made to explore the possibility of having renewed catalytic activity of an used-up sieve after conventional reactivation of the latter. It is also intended to develop stereoregulating catalyst systems from these sieve catalysts after appropriate metal-loading of these sieves and necessary modification of these systems. The results of this work are expected to open up a promising and relatively new field of application of these materials, now being produced indigenously, and will be of considerable significance to the rapidly growing polymer industries of the country.

Immunodiagnostic Test for Detection of Asymptomatic Malignant Lymphomas

Lymphomas are cancers of the lymphoid tissues and are usually diagnosed by histological methods. But occasionally no disease is apparent except intractable low-grade pyrexia. So far no serological test has been devised for the detection of these cancers. These lymphomas affect all age groups and are predominantly manifested in children. Hence, an immunological test for this type of malignancy may prove useful. Immunodiagnosis is one of the several recent types of appra-

ches and involves the detection of antigenic markers present in the circulation. The tumour cells may contain antigens which are undetectable or are present in smaller amounts in normal cells. On this basis, antibodies in the sera of animals immunized against these antigens can potentially be used to discriminate between tumour cells and normal cells.

The object of the study to be made under a CSIR project by Dr M. Udayachander, Head of the Biochemistry Department, Cancer Institute, Madras, is to evaluate an immunological test for the detection of asymptomatic malignant lymphomas. This test will be based on the antigen-antibody reaction and will be carried out using agar-gel double diffusion technique, immunoelectrophoresis, counter-electrophoresis and radio immunoassay techniques. Preliminary studies carried out along these lines have shown encouraging results.

If a circulating antigen is present in the sera of these patients, the effect of treatment on the appearance of these antigens could be studied. Such a study will be of considerable value in the diagnosis, prognosis and in the detection of recurrence or metastasis.

Effects of Scorpion Venom on Physiological Changes in Animal Tissues

The Tirumalai-Tirupati region is rich both in Buthoid and Chactoid fauna of scorpions. The virulency of the venom varies from species to species, causing sometimes intense pain or even death to humans. In a new CSIR research scheme granted to Dr K. Sasira Babu, Department of Zoology, S. V. University, Tirupati, it is proposed to determine the chemical composition of different protein fractions in the venom of various species of scorpion. Since each protein fraction of the venom might have a specific effect, different fractions of the different species will be separated and their nature of action on different physiological activi-

ties will be studied on certain animals. This may throw light on the active principle concerned with venom action.

The lethality of these scorpion venoms will be studied by injecting varying quantities of crude or fractionated venom into different invertebrate and vertebrate groups. LD₅₀ of a particular group of animals to a specific venom (Buthoid or Chactoid) will be taken as a criterion to assess the toxicity.

By administering sublethal doses into test animals, various physiological changes, viz. enzymatic, electrical, and respiratory, will be studied *in vivo* or *in vitro*. The tolerance of different tissues to the toxicity of venom will be studied at molecular level. Attempts will also be made to neutralize the toxic effects of venom by administering selected antidotes.

PERSONNEL NEWS

Appointments/Promotions

Dr S. Balakrishna

Dr S. Balakrishna of the National Geophysical Research Institute (NGRI), Hyderabad, has been appointed Scientist E II, on promotion from Scientist E I, with effect from 17 December 1975. Dr Balakrishna (born 3 Aug. 1931) was educated at Andhra University from where he obtained his B.Sc. (Hons) (1951) and M.Sc. (1953) degrees in geology and Ph.D (1955). He was a Fullbright and Smith-Mundt postdoctoral research fellow in Dumbear Laboratory, Harvard University, Cambridge, during 1956-57 and attended courses in structural geology, seismology, geophysics, and X-ray crystallography.

Dr S. Balakrishna worked at the Osmania University, Hyderabad, from 1953 to 1961 in various capacities. He joined NGRI as Assistant Director in 1962.

At NGRI he has carried out research on physical properties of rocks in relation to their geological features, deformation of the earth by earth-tide studies, geophysical investigations—both gravity and magnetic,

and has undertaken intensive studies on rock mechanics. He is operating geophysical sponsored survey projects for groundwater, minerals and engineering problems. So far, 65 technical reports have been released to various private and public parties.

Dr Balakrishna participated in the eleventh Pacific Science Congress held at Tokyo in 1966 on special invitation from UNESCO. He also attended IUGG meetings in Zurich (1967), Moscow (1971) and Grenoble, France (1975). He participated in the International Geodynamics Meeting at Peru (1973) and attended the Upper Mantle Project symposium at Tokyo in 1968.

Dr Balakrishna has organized about 25 national and international symposia on different aspects of geology, geophysics and social implications of sciences and has over 100 research contributions to his credit. He was awarded the Krishnan gold medal in 1967 for outstanding work on physical properties of rocks. He has guided 14 students for their Ph.D. degrees and edited five standard textbooks. He is the member-secretary of the Indian Geophysical Union and fellow and honorary secretary of the Andhra Pradesh Academy of Sciences.

Dr P. V. Sanker Narayan

Dr P. V. Sanker Narayan of the National Geophysical Research Institute (NGRI), Hyderabad, has been appointed Scientist E II, on promotion from Scientist E I, with effect from 17 December 1975. Dr Sanker Narayan (born 5 Aug. 1923) had his early education in Kerala and took his B. Sc. degree in physics from the Madras University (1943). He worked at the India Meteorological Department from 1944 to 1956. In 1956 he left for USA and took his M. S. degree in physics (1958) and Ph.D. in geology and geophysics (1961) from the Wisconsin University. He also taught engineering geology and geophysics at the university for a short while. While at Wisconsin he adapted the then new nuclear precession magneto-

meter for surveying from air and covered the complete state of Wisconsin with an aeromagnetic survey during 1960-61.

On return from USA he joined CSIR as a Pool Officer at NGRI (March 1962) and subsequently took up appointment as Senior Scientific Officer (Oct. 1962).

At NGRI he developed a division in geomagnetism and geoelectricity with a magnetic observatory in the institute's campus (set up in 1964) and a micropulsation observatory (set up in 1967) about 50 km from Hyderabad. Under an Indo-Soviet scientific collaboration project, he established in 1975 an equatorial observatory near Etaiyapuram (Tamil Nadu) in the vicinity of the earth's magnetic (dip) equator. The station records continuously the micropulsations of the earth's electromagnetic field and also maintains a conventional geomagnetic observatory. He was appointed Scientist E I on merit promotion in April 1966. Since 1967, he has been associated with airborne geophysical surveys, and heads the group in its programme of sponsored aerogeophysical surveys.

Dr Sanker Narayan is the principal investigator from the Indian side for the Indo-Soviet scientific collaboration project on micropulsation studies in India. He was a member of the working group on micropulsations of the International Association of Geomagnetism and Aeronomy. In 1968 he visited the space laboratory of Imperial College, London, the Rudeskov Magnetic Observatory and Danish Meteorological Institute, Copenhagen. He visited USSR (Aug.-Sep. 1971) in connection with the Indo-Soviet scientific collaboration project. During this trip he also attended the fifteenth general assembly of the International Union of Geodesy and Geophysics held at Moscow.

In September 1973, he participated in the 12-day scientific assembly of the International Association of Geomag-

netism and Aeronomy at Kyoto, Japan.

Dr Sanker Narayan has published more than 40 research papers and a number of technical reports.

Shri D. Gupta Sarma

Shri Dharmajit Gupta Sarma of the National Geophysical Research Institute (NGRI), Hyderabad, has been appointed Scientist E II, on promotion from Scientist EI, with effect from 17 December 1975. Shri Gupta Sarma (born 16 July 1932) had a brilliant academic career at Calcutta University, securing first rank in M.Sc. (radio physics) and obtaining a number of awards and scholarships. He started his research career in 1953 at the Institute of Radio Physics and Electronics, Calcutta, as a research scholar and was subsequently appointed lecturer (1955).

Before joining NGRI (1965) as Assistant Director, he worked at the Geological Survey of India as a senior geophysicist. At NGRI, he undertook the design, development and production of geophysical instruments on batch scale and contributed to the development of a strong geophysical instrumentation group. Shri Gupta Sarma has developed indigenous instruments for airborne geophysical surveys. His attainments in the field of magnetometric and EM airborne geophysical instrumentation have led to the Indian government's decision that no foreign contracts should be entered into for airborne magnetometric surveys in future.

The electrical resistivity and ground electromagnetic instruments developed by Shri Gupta Sarma have been used very extensively in the country by NGRI and other organizations in the search for groundwater and minerals. These developments have made available to the Indian geophysicists instruments which would otherwise have to be imported.

He has offered expert consultancy services in making specialized measurements, repairing and setting up of equipment for different organizations like the Geological Survey of India, Survey of India, etc.

Shri Gupta Sarma has published a number of research papers and has a patent to his credit. He is a member of various NCST sub-committees concerned with instrumentation for earth science and remote sensing. He has visited West Germany, France, Sweden, England, USA and Canada to study the latest developments in the field of exploration geophysics for minerals.

He was awarded the 1972 Krishnan gold medal by IGU for outstanding contributions in the field of geophysical instrumentation.

Honours

Shri A. M. Nanjunda Swamy, Shri G. Radhakrishnaiah Shetty and Smt. S. Saroja, all of the Central Food Technological Research Institute, Mysore, have been awarded the Yezdi award for their paper entitled 'Studies on the development of newer products from mango' published in *Indian Food Packer* in 1976.

The award, instituted by Yezdi Industries, Mysore, is given to the best research paper with immediate application to industry, published in *Indian Food Packer*.

Dr M. Mahadeviah of the Central Food Technological Research Institute, Mysore, has been awarded the K. U. Patel memorial award by the All India Food Preservers' Association for his paper entitled 'Internal corrosion of tinsplate containers with food products' published in *Indian Food Packer* in 1976. This award is given to the best research/review paper in food technology published in *Indian Food Packer* and is useful to the food preservation industry.